

Applied Pediatric Math: Bridging the Gap Between Theory and Practice for a Diverse Group of Learners

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Objectives

Upon completion of this presentation, the learner will be able to:

- Discuss one change that can be made to bridge the gap between didactic and clinical math practice at the learner's institution.
- Identify how medication skills stations can be set up to benefit a group of diverse learners with different mathematics backgrounds and learning styles.
- Explain the benefit of utilizing medication skills stations to meet student learning outcomes in undergraduate nursing education programs.
- Value the need for creative solutions to dosage calculation problems within the classroom to better connect didactic and clinical learning.
- Develop medication skills stations in the educator's area of expertise.

Background

- A gap exists between didactic theory and clinical practice when nursing students learn clinical calculations.
- Traditional paper-based assessments do not measure mathematics skills in the same fashion as bedside nurses must apply it.
- Innovative classroom teaching and evaluation methods can facilitate mathematics learning in order to decrease the theory-practice gap and to have a predictable effect on patient safety outcomes.



Implementation

- **Setting:** Pediatrics specialty course in an undergraduate nursing program in suburban Philadelphia
 - Student learning outcomes include performing safe weight-based medication and intravenous (IV) fluid calculations
- **Design:** Skills stations in simulation lab
 - Students completed practical mathematics problems that simulate clinical application
- Students divided into groups of 8 and independently rotated between medication stations
 - At each station, students performed necessary calculations based on medication orders from the electronic health record
 - Safe dosage ranges, IV fluid volumes and rates, medication volumes and weight conversions
- Students used hospital equipment to perform the psychomotor skills
 - Drew up the medication in oral syringes, programmed IV pumps and administered injections

Station #3

Sample, John (7 year old M)

Dosing Weight: 70 lbs

Order: enoxaparin injection 15 mg, Subcutaneous, EVERY 12 HOURS

Questions:

1. Convert lbs - kg _____ kg
2. Is this ordered dose safe? 0.5 mg/kg/DOSE _____
3. What lab value(s) would you look up prior to administration? _____
4. What size needle would you use? _____ g _____ inch
5. Where would you administer? _____
6. How many mLs will you administer? 300 mg/3 mL _____ mL
7. Draw up in syringe and practice administering

Benefits

- Safe medication administration can be achieved without the limits of a defined dosage calculation method or a designated time frame
- Immediate reinforcement can be provided to help students discover the correct answer and learn the proper skills
- Enables inclusion and benefits a diverse student body as individuals can learn from each other in a group setting that mirrors the registered nurses' environment
- Minimizes disparities found when students have differing mathematics backgrounds and different learning styles
- Promotes critical thinking and application of didactic math content while facilitating learning in both the cognitive and the psychomotor domains



Feedback

- **Faculty Feedback:** Students were engaged, active learners
 - Took notes, asked questions and offered comments without prompting
- **Student Feedback:** "More helpful than sitting and doing problems"
 - "Helped me critically think, more applicable"
 - "This is how medication administration is; distractions are present"

Implications for Nursing Education

Math skills stations can be:

- Incorporated into hospital orientation programs
 - Interleave calculations into IV pump classes
 - Comprehensive math assessment shows cognitive and psychomotor mastery
 - Ensures adherence to hospital policy
 - Enables everyone to start at the same level no matter the math background, learning style preference
- Used as a replacement for paper-based clinical calculations exams
 - Spaced out quizzing of math calculations and skills in the simulation lab through the term
 - Calculations final demonstrating cognitive and psychomotor competence
- Utilized as part of nursing students' pediatric clinical orientation

Educators can promote safe nursing practice by utilizing creative solutions to dosage calculation problems within the classroom that better connect didactic and clinical learning

Discussion

- How could you see this working at your institution?
- What changes could you suggest to allow this to be utilized in more settings?
- Seeking input from didactic educators, hospital educators, orientation coordinators and staff nurses
- **Contact Information:** Please feel free to contact us!

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